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# SCIENCE

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## SOME NEW ELECTRIC MOTORS.

FOR several years past the C. & C. Electric Motor Company have devoted their entire energies to the manufacture of small motors, having built thirty-six hundred motors of  $\frac{1}{2}$  horse-power, and over five hundred  $\frac{1}{4}$  and  $\frac{3}{4}$  horse-power motors. While this company have built motors as large as 5 horse-power, they have not until recently, when the new shops were completed, undertaken to sup-

The machines present a few peculiarities. The field-magnet cores are drop-forged, are circular in shape, and are concentric with the shaft, being oblong in cross-section, and of a width equal to the axial length of iron in the armature. These cores, when bolted to the base of the pole-pieces, completely surround the armature, which is of the drum type, and in its general proportions resembles a Gramme ring, in which the radial depth is increased until the annular ring reaches the shaft, thus forming a drum ar-

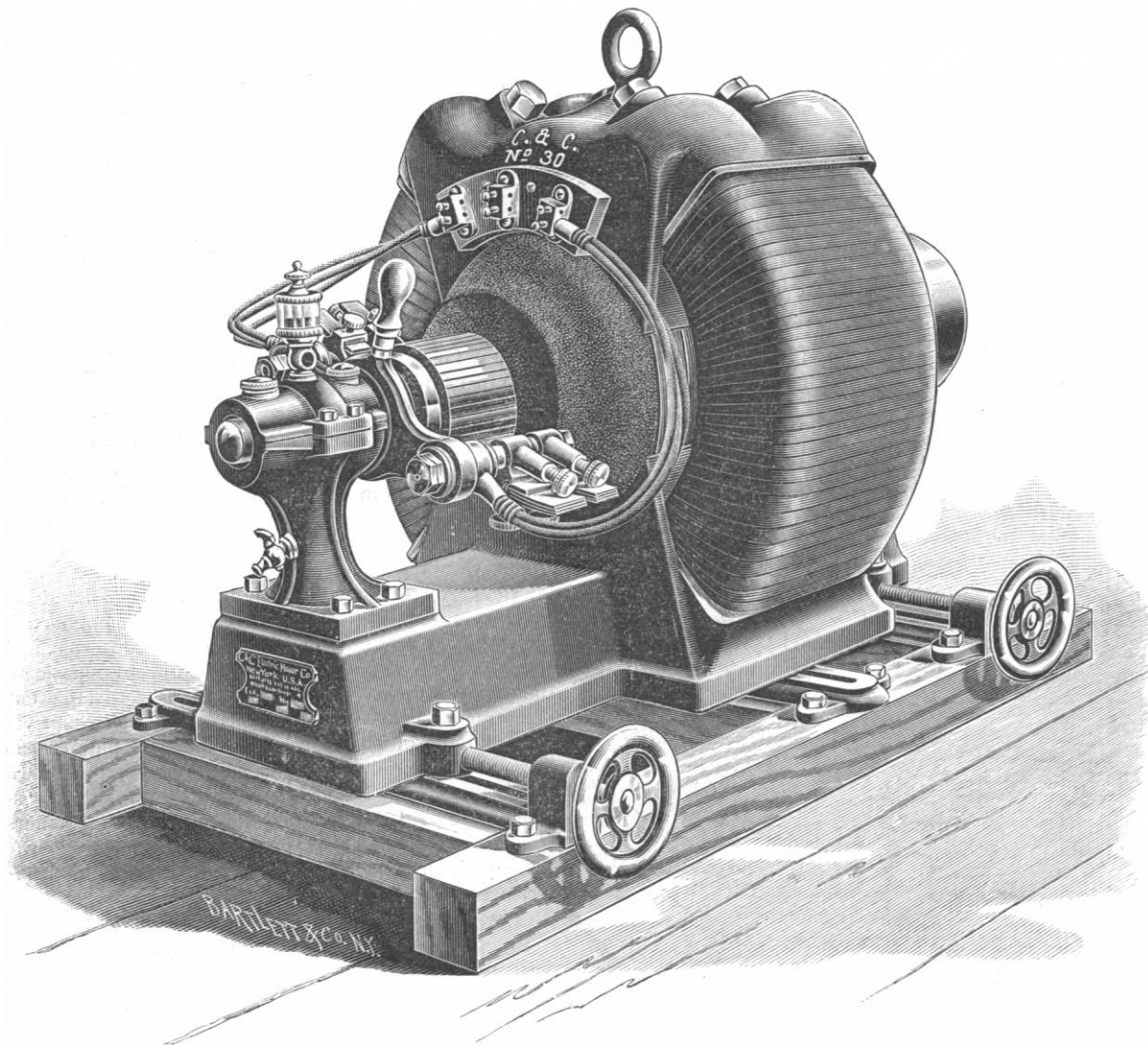


FIG. 1.—FIFTEEN-HORSE-POWER C. & C. MOTOR.

ply those of larger power, their old shops having been fully occupied with orders for small motors.

We recently described their new factory, and since the company moved in, Mr. Lemuel William Serrell has designed for them motors as large as 25 horse-power. The design of these larger motors is shown in the accompanying cuts. Fig. 1 is of a 15 horse-power, Fig. 2 of a 3 horse-power, motor.

mature of large diameter. This form requires little wire, and the air-space resistance between the pole-piece and the armature is reduced to a minimum.

The windings are calculated by dealing with the magnetic circuit as if it were an electric circuit, following Ohm's law: magnetic potential taking the place of volts; and lines of force, current; and the resistance of the iron when below saturation to the flow of

lines of force, the resistance of a wire to an electric current. The shortest possible length for the magnetic circuit is obtained by giving a circular form to the machine. The result shows that the machines have come out very close to their estimated power, the

claimed to have considerable advantage over most slow-running fans. Two of these fans have been successfully employed to ventilate a hall 100 feet square, being placed opposite each other, and both used as exhausts. Another method employed is to place one

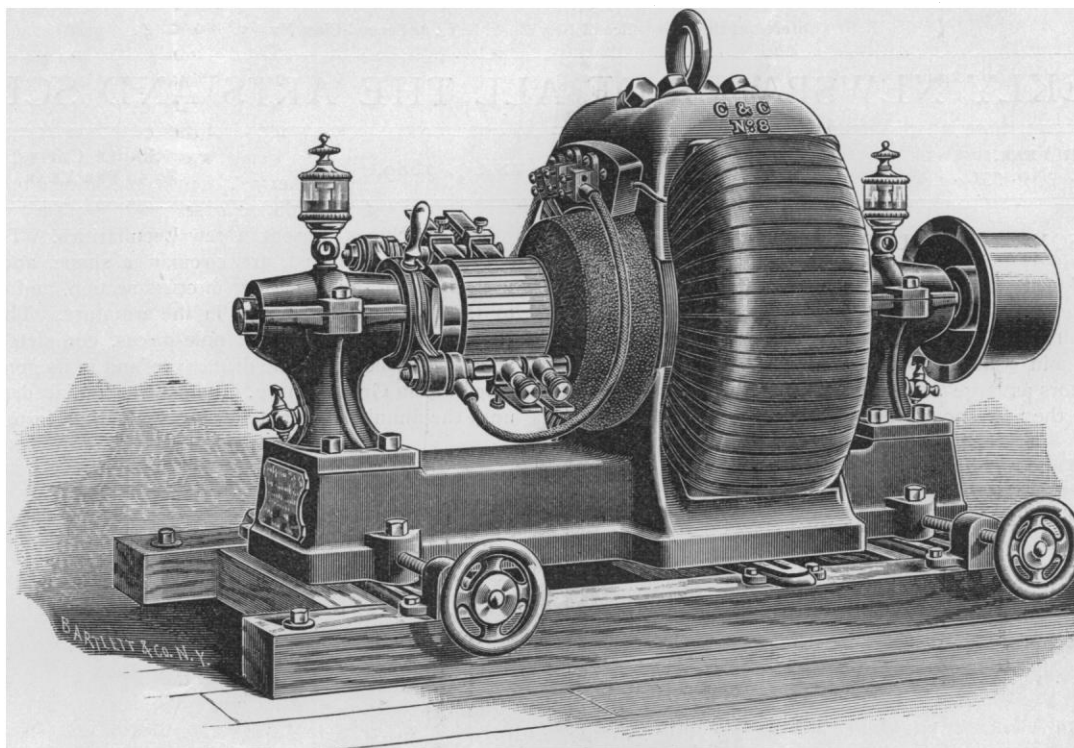


FIG. 2.—THREE-HORSE-POWER C. & C. MOTOR.

actual number of volts developed being 109 against 110 in a 3-horse power motor. It has been aimed at to eliminate Foucault's currents and undue heating.

of these fans at either end of a hall, one running as an exhaust, and the other forcing air in.

#### WATER-FILTRATION.

PROBABLY at no time has the condition of the water-supply of our cities and towns received more attention than at present, and perhaps no one thing has conduced to this state of affairs more than the discovery that certain salts contained in the earth act as renovators of all so-called "spring" waters, purging them, so to speak, of the foul matters held both in solution and in suspension.

Up to the time of this discovery, it was thought that the earth acted merely as a filter or strainer on a large scale, and that each grain or atom of earth acted its part toward opposing or arresting impurities in the passing water; in other words, that only mechanical straining or filtering took place, and nothing more.

Multitudes of filters have been made and put in operation in all ages and countries with the expectation of seeing the water emerge from them as pure and sparkling as from a good "spring," and the greatest surprise has been manifested at the failure to secure the same results when apparently every condition was supplied. The question remains, "Was every condition supplied?" Modern science answers, "No."

The peculiar action of the above salts upon the portion of impurities said to be held in solution is well illustrated by the effects produced by dissolving soap in a water of great (so called) hardness. The white flakes that almost instantly appear are composed not alone of dissolved soap (for soft water would not show such individualized flakes), but a mixture of soap and some substance hitherto held in undisturbed solution in the water, but now withdrawn from that condition and floating about in mechanical suspension.

It will be plain that if this soap-treated water was now poured into the earth at one point, and made to emerge at another some distance off, it would be found purged of not alone the soap it contained, but also of the modicum of foreign matter held in its embrace, and which went to make up the quality of hardness spoken of.

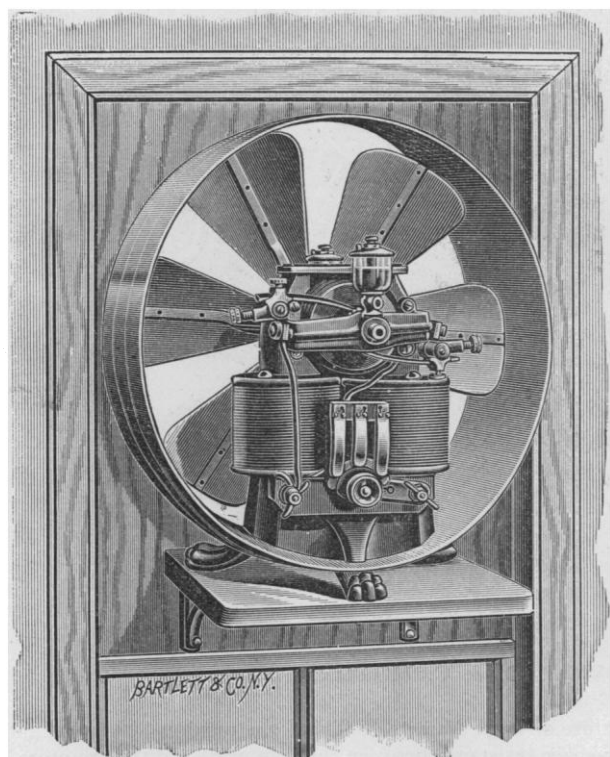


FIG. 3.—THE C. & C. COMPANY'S MOTOR AND EXHAUST FAN.

Another application of this motor is to the driving of ventilating-fans. Fig. 3 shows a  $\frac{1}{4}$ -horse-power incandescent motor fan outfit. This apparatus at a speed of one thousand revolutions a minute is